CITY OF CHULA VISTA

DEPARTMENT OF PLANNING & BUILDING

BUILDING DIVISION

276 Fourth Avenue Chula Vista CA 91910

619-691-5272 619-585-5681 FAX

FORM 4605

ALLOWABLE SHEAR FOR WOOD STUD WALLS

I. Allowable Shear Values

The following table shear values are reproduced from the 2001 California Building Code.

TABLE 23-II-H-ALLOWABLE SHEAR IN POUNDS PER FOOT FOR HORIZONTAL WOOD STRUCTURAL PANEL DIAPHRAGMS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE[1]

PANEL GRADE	COMMON NAIL SIZE	MINIMUM NAIL PENETRATION IN FRAMING (inches)	MINIMUM NOMINAL PANEL THICKNESS (inches)	MINIMUM NOMINAL WIDTH OF FRAMING MEMBER (inches)	BLOCKED DIAPHRAGMS: Nail spacing (in.) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 and 4) and at all panel edges (Cases 5 and 6)				UNBLOCKED DIAPHRAGMS: Nails spaced 6" max. at supported edges	
					6	4	$2^1/_2$[2]	2[2]	Case 1 (No unblocked edges or continuous joints parallel to load)	All other configurations (Cases 2, 3, 4, 5 and 6)
					Nail spacing (in.) at other panel edges					
					6	6	4	3		
Structural 1	6d	$1^1/_4$	$^5/_{16}$	2	185	250	375	420	165	125
				3	210	280	420	475	185	140
	8d	$1^1/_2$	$^3/_8$	2	270	360	530	600	240	180
				3	300	400	600	675	265	200
	10d[3]	$1^5/_8$	$^{15}/_{32}$	2	320	425	640	730	285	215
				3	360	480	720	820	320	240
C-D, C-C, Sheathing, and other grades covered in UBC Standard 23-2 or 23-3	6d	$1^1/_4$	$^5/_{16}$	2	170	225	335	380	150	110
				3	190	250	380	430	170	125
			$^3/_8$	2	185	250	375	420	165	125
				3	210	280	420	475	185	140
	8d	$1^1/_2$	$^3/_8$	2	240	320	480	545	215	160
				3	270	360	540	610	240	180
			$^7/_{16}$	2	255	340	505	575	230	170
				3	285	380	570	645	255	190
			$^{15}/_{32}$	2	270	360	530	600	240	180
				3	300	400	600	675	265	200
	10d[3]	$1^5/_8$	$^{15}/_{32}$	2	290	385	575	655	255	190
				3	325	430	650	735	290	215
			$^{19}/_{32}$	2	320	425	640	730	285	215
				3	360	480	720	820	320	240

[1]These values are for short-time loads due to wind or earthquake and must be reduced 25 percent for normal loading. Space nails 12 inches on center along intermediate framing members.

Allowable shear values for nails in framing members of other species set forth in Division III, Part III, shall be calculated for all other grades by multiplying the shear capacities for nails in Structural I by the following factors: 0.82 for species with specific gravity greater than or equal to 0.42 but less than 0.49, and 0.65 for species with a specific gravity less than 0.42.

[2]Framing at adjoining panel edges shall be 3-inch nominal or wider and nails shall be staggered where nails are spaced 2 inches or 2½ inches on center.

[3]Framing at adjoining panel edges shall be 3-inch nominal or wider and nails shall be staggered where 10d nails having penetration into framing of more than 1⅝ inches are spaced 3 inches or less on center.

TABLE 23-II-J-ALLOWABLE SHEARS FOR WIND OR SEISMIC LOADING ON VERTICAL DIAPHRAGMS OF FIBERBOARD SHEATHING BOARD CONSTRUCTION FOR TYPE V CONSTRUCTION ONLY[1]

SIZE AND APPLICATION	NAIL SIZE	SHEAR VALUE IN POUNDS PER FOOT 3-INCH NAIL SPACING AROUND PERIMETER AND 6-INCH AT INTERMEDIATE POINTS
$^1/_2$" 4' x 8'	No. 11 gage galvanized roofing nail $1^1/_2$" long, $^7/_{16}$" head	125[2]
$^{25}/_{32}$" 4' x 8'	No. 11 gage galvanized roofing nail $1^3/_4$" long, $^7/_{16}$" head	175

[1]Fiberboard sheathing diaphragms shall not be used to brace concrete or masonry walls.

[2]The shear value may be 175 for ½-inch-by-4-foot-by-8-foot fiberboard nail-base sheathing.

TABLE 23-II-I-1-ALLOWABLE SHEAR FOR WIND OR SEISMIC FORCES IN POUNDS PER FOOT FOR WOOD STRUCTURAL PANEL SHEAR WALLS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE[1,2,3]

PANEL GRADE	MINIMUM NOMINAL PANEL THICKNESS (inches)	MINIMUM NAIL PENETRATION IN FRAMING (inches)	PANELS APPLIED DIRECTLY TO FRAMING					PANELS APPLIED OVER 1/2-INCH (13 mm) OR 5/8-INCH (16 mm) GYPSUM SHEATHING				
			Nail Size (Common or Galvanized Box)[5]	Nail Spacing at Panel Edges (in.)				Nail Size (Common or Galvanized Box)[5]	Nail Spacing at Panel Edges (in.)			
				6	4	3	2		6	4	3	2
Structural I	5/16	1 1/4	6d	200	300	390	510	8d	200	300	390	510
	3/8	1 1/2	8d	230[4]	360[4]	460[4]	610[4]	10d	280	430	550	730
	7/16			255[4]	395[4]	505[4]	670[4]					
	15/32			280	430	550	730					
	15/32	1 5/8	10d	340	510	665	870					
C-D, C-C Sheathing, plywood panel siding and other grades covered in UBC Standard 23-2 or 23-3	5/16	1 1/4	6d	180	270	350	450	8d	180	270	350	450
	3/8			200	300	390	510		200	300	390	510
	3/8	1 5/8	8d	220[4]	320[4]	410[4]	530[4]	10d	260	380	490	640
	7/16			240[4]	350[4]	450[4]	585[4]					
	15/32			260	380	490	640					
	15/32	1 1/2	10d	310	460	600	770					
	19/32			340	510	665	870					
			Nail Size (Galvanized casing)					Nail Size (Galvanized casing)				
Plywood panel siding in grades covered in UBC Standard 23-2	5/16	1 1/4	6d	140	210	275	360	8d	140	210	275	360
	3/8	1 1/2	8d	160	240	310	410	10d	160	240	310	410

[1]All panel edges backed with 2-inch nominal or wider framing. Panels installed either horizontally or vertically. Space nails at 6 inches on center along intermediate framing members for 3/8-inch and 7/16-inch panels installed on studs spaced 24 inches on center and 12 inches on center for other conditions and panel thicknesses. These values are for short-time loads due to wind or earthquake and must be reduced 25 percent for normal loading. Allowable shear values for nails in framing members of other species set forth in Division III, Part III, shall be calculated for all other grades by multiplying the shear capacities for nails in Structural I by the following factors: 0.82 for species with specific gravity greater than or equal to 0.42 but less than 0.49, and 0.65 for species with a specific gravity less than 0.42.

[2]Where panels are applied on both faces of a wall and nail spacing is less than 6 inches on center on either side, panel joints shall be offset to fall on different framing members or framing shall be 3-inch nominal or thicker and nails on each side shall be staggered.

[3]In Seismic Zones 3 and 4, where allowable shear values exceed 350 pounds per foot, foundation sill plates and all framing members receiving edge nailing from abutting panels shall not be less than a single 3-inch nominal member and foundation sill plates shall not be less than a single 3-inch nominal member. In shear walls where total wall design shear does not exceed 600 pounds per foot, a single 2-inch nominal sill plate may be used, provided anchor bolts are designed for a load capacity of 50 percent or less of the allowable capacity and bolts have a minimum of 2-inch-by-2-inch-by-3/16-inch thick plate washers. Plywood joint and sill plate nailing shall be staggered in all cases.

[4]The values for 3/8-inch and 7/16-inch panels applied direct to framing may be increased to values shown for 15/32-inch panels, provided studs are spaced a maximum of 16 inches on center or panels are applied with long dimension across studs.

[5]Galvanized nails shall be hot-dipped or tumbled.

TABLE 23-II-I-2-ALLOWABLE SHEAR IN POUNDS PER FOOT FOR PARTICLEBOARD SHEAR WALLS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE[1,2,3]

PANEL GRADE	MINIMUM NOMINAL PANEL THICKNESS (inches)	MINIMUM NAIL PENETRATION IN FRAMING (inches)	PANELS APPLIED DIRECT TO FRAMING				
			Nail size (Common or Galvanized Box)	Allowable Shear (pounds per foot)[1] Nail Spacing at Panel Edges (inches)			
				6	4	3	2
M-S[4] and M-2[4]	3/8	1 1/2	6d	120	180	230	300
	3/8	1 1/2	8d	130	190	240	315
	1/2			140	210	270	350
	1/2	1 5/8	10d[5]	185	275	360	460
	5/8			200	305	395	520

[1]All panel edges backed with 2-inch nominal or wider framing. Space nails at 6 inches on center along intermediate framing members for 3/8-inch panel installed with the long dimension parallel to studs spaced 24 inches on center and 12 inches on center for other conditions and panel thicknesses. These values are for short-time loads due to wind or earthquake and must be reduced 25 percent for normal loading.Allowable shear values for nails in framing members of other species set forth in Division III, Part III, shall be calculated for all grades by multiplying the values for common and galvanized box nails by the following factors: Group III, 0.82 and Group IV, 0.65.

[2]Where particleboard is applied on both faces of a wall and nail spacing is less than 6 inches on center on either side, panel joints shall be offset to fall on different framing members, or framing shall be 3-inch nominal or thicker and nails on each side shall be staggered.

[3]In Seismic Zones 3 and 4, where allowable shear values exceed 350 pounds per foot, foundation sill plates and all framing members receiving edge nailing from abutting panels shall not be less than a single 3-inch nominal member and foundation sill plates shall not be less than a single 3-inch nominal member. In shear walls where total wall design shear does not exceed 600 pounds per foot, a single 2-inch nominal sill plate may be used, provided anchor bolts are designed for a load capacity of 50 percent or less of the allowable capacity and bolts have a minimum of 2-inch-by-2-inch-by-3/16-inch thick plate washers. Plywood joint and sill plate nailing shall be staggered in all cases.

[4]Products shall be manufactured with exterior glue and shall be identified with the words “Exterior Glue” following the product grade designation.

[5]Framing at adjoining panel edges shall be 3-inch nominal or wider and nails shall be staggered where 10d nails having penetration into framing of more than 1 5/8 inches are spaced 3 inches or less on center.